

Dr. Airy's Report to the Local Government Board on the Water Supply of Atherstone and Polesworth, in Warwickshire.

EDWARD C. SEATON, M.D.,
Medical Department,
 February 19, 1878.

For several years past the Board have had correspondence with the Guardians of the Atherstone Union, in Warwickshire, in reference to water supply. In November 1877 a copy of a report on the subject by the Medical Officer of Health for the Atherstone Rural Sanitary District was received, from which it appeared that no effective steps had been taken by the Sanitary Authority towards improvement of the water supply. The Board thereupon ordered a sanitary inspection of the places concerned.

I beg to report that, having been instructed to make this inquiry, I visited Atherstone for that purpose on January 3-5, 1878, and put myself in communication with the Clerk to the Sanitary Authority (Mr. J. K. Fielder), the Medical Officer of Health (Mr. T. Handford), and the Inspector of Nuisances (Mr. J. Fitter), from all of whom I received valuable assistance in my inquiry.

The inspection was confined to the town of Atherstone and the village of Polesworth, which are the two principal places in the Atherstone Union, and are situated about $4\frac{1}{2}$ miles apart in the valley of the river Anker, a tributary of the Tame.

The Atherstone Union constitutes a rural sanitary district, not including any urban district. The Sanitary Authority are the Board of Guardians, who meet every fortnight for sanitary business. By an Order of the Local Government Board (1876) the Atherstone Rural Sanitary Authority are invested with urban powers embracing Sections 44, 157, 158 and 169, of the Public Health Act, 1875, excepting so much of Section 169 as relates to the providing of slaughter-houses. The Medical Officer of Health receives a salary of 40*l.*, and the Inspector of Nuisances a salary of 100*l.* Record is kept by them of inspections made, orders given, and results obtained, and reports are made by them to the Sanitary Authority at its fortnightly meetings. The Medical Officer of Health also reports annually.

The population of the district was, in 1861, 12,118; in 1871 it had fallen to 11,875; since then it has probably risen again, owing to the subsequent prosperity in the coal trade, which affects a great part of the district, and (more recently) in the hat trade, which is the speciality of the town of Atherstone.

Estimating the population of the district at 12,000, it appears from the Registrar-General's quarterly returns that the general mortality from 1870 to 1877 inclusive has been rather high, showing an average of 20 per 1,000 of the population. As regards the mortality from special diseases it is noticeable that "fever" (*i.e.*, mainly enteric fever) has contributed an annual average of nearly 0.5, and diarrhœa an average of nearly 1.0 per 1,000. From an examination of the death register it appears that the deaths from diarrhœa have occurred chiefly in the town of Atherstone.

ATHERSTONE.

Description.—The population of Atherstone was 3,877 in 1861, and 3,667 in 1871. The decrease in the decennium was attributed to stagnation in the hat trade. Since then the hat trade has greatly improved, and the population has considerably increased. Estimated on the number of inhabited houses according to a census lately made for the School Board, and kindly furnished to me by the School Board Officer (Mr. Hatton), who is also Registrar of Births and Deaths, it is now about 4,150.

Atherstone lies on a bed of the New Red Sandstone formation, just outside the eastern escarpment of the Warwickshire coal-field. The subsoil to a great depth consists of a thick marl not easily permeable to fluid, and contains an indurated band of a half slaty character which is strong enough to give a base for well brickwork to rest upon. Water is generally found to enter the wells at this band. The ground slopes gently to the north-east. At the foot of the slope, about three-quarters of a mile from the town, is the river Anker, flowing towards the north-west. Some of the intervening meadows are irrigated with the town sewage (to be described below), the effluent water passing into the river about a mile lower down. To the south-west of the town the ground rises for about two miles, forming wooded hills, partly occupied by Merevale and Bentley Parks, and the Atherstone Outwoods. It is to these hills that the people of Atherstone naturally look for a supply of pure water. The town itself extends for about half a mile along the old Roman Watling Street, which runs west-north-west. On either side of this main street, and about 100 yards distant from it, runs a back street, parallel to the main street. Two or three streets run across these, and the whole space between them

is parcelled out into rows of houses with narrow alleys between them, almost comparable for straitness and density to the "rows" of Yarmouth. While the houses fronting the main street are for the most part well faced and properly cared for in respect of roof drainage, those in the narrow courts are in many cases sadly dilapidated and wholly without eaves-troughs, and rain-pipes. The courts themselves show great variety in the matter of paving, some being very carefully paved with close-laid bricks, others irregularly set with rough cobble-stones, and others presenting the bare earth to the soakage of the rain-water from the roofs and walls of surrounding buildings.

Water Supply. Wells.—In each court, as a rule, there is at least one pump; in many there are two or three. Altogether in Atherstone there are more than 200 wells. They are sunk in the marl above described and average about 60 feet in depth, the water standing within 30 or 40 feet of the surface. Possibly some of them are not open to serious objection, but the very great majority are so placed that it is almost impossible for them to have escaped pollution. Often there is a distance of only three or four steps between the pump and the privy. In the rear of the privy is an open cesspit receiving the privy matters, with all kinds of house refuse, dust, and ashes, receiving also the rain that falls upon it, and very often the drainage of the privy roof and neighbouring outhouses. The cesspit is not cemented or in any way made water-tight at bottom. In some cases a drain leads from the bottom of the cesspit to the sewer, but in any and every case there cannot fail to be saturation of the soil under the cesspit with excrementitious matter. It might be thought that the thick marl in which the wells are sunk would forbid the soakage of filth from the surface into the wells; but it must be remembered that in an old town like Atherstone the whole surface soil has been turned and re-turned again and again; much of it is probably "made ground;" it is no longer the impermeable clay, but is honeycombed with fissures and loosely filled holes and trenches, all of which would offer easy passage to fluid matters soaking in from the surface. Even the most thorough puddling and cementing of the wells, though it might guard them against soakage from surface filth in their immediate vicinity, would hardly ensure them against pollution from more distant sources. The Medical Officer of Health has given very careful attention to these wells. During the past year, having been requested to report on the water supply, he examined the physical characters of the water from 205 wells; of these, 96 were apparently good, 21 were manifestly bad, and 88 were doubtful. From 9 of the doubtful ones, samples were sent to Dr. Hill of Birmingham, the county analyst. The general results of the analysis were thus described by Dr. Hill, "I find that with the exception of one sample (that labelled 'J') " they are all largely polluted with animal matter, doubtless of excrementitious origin. " The sample 'F,' although containing no nitrates, evidencing contamination of long " standing, contains so much ammonia as to be dangerous for drinking. The other " samples B, C, D, E, G, I, K, are all contaminated and must be considered quite unfit for " domestic use. They are all very hard and therefore not suited for washing and " cleansing. The sample 'J,' although not so bad as the others, still shows evidence " of some contamination, besides this, it is very hard, and if used at all should be first " boiled and then filtered." Now this chemical evidence of contamination is of a kind that is known to be independent of the physical character of the water. The clearness of well water affords no proof of its purity. From the above results it must be inferred that the great majority of the wells in Atherstone are polluted.

Relation of Well-water to Disease.—That this pollution has occasionally received a specifically poisonous character is shown by facts of epidemic filth disease occurring in relation to particular wells. The latest instance is as instructive as any. On one side of the market place there are three adjoining houses (A, B, C), supplied with water from one pump in the back yard. Three yards from the pump and at a somewhat higher level is the privy with its soaking cesspit. About three years ago there was a case of enteric fever at one of these houses (A). Three months ago an elderly man in another of these three houses (C) was taken ill with enteric fever; a woman who nursed him was next taken ill with the same disease and was removed to the workhouse; still later a servant at the first house A was taken ill and was conveyed to her home in the country. Hitherto the dwellers in the house B have escaped.

In the year 1872 there was a severe outbreak of enteric fever in Atherstone, apparently in connexion with impurity of the well water. There occurred 50 cases, of which 5 were fatal. There appears also to be much illness of an enteric character short of pronounced fever, among the denizens of these unwholesome courts. Diarrhœa is unduly prevalent, adding considerably to the infantile mortality. I heard of whole families being laid up together "with sickness and purging." These facts all point to impurity of the drinking water.

Other Sources of Water Supply.—Some of the dwellers at the west end of the town get water from a roadside spout which is supplied by part of an overflow of a reservoir in Merevale Park. Of that overflow about two-thirds are taken by the Coventry Canal which skirts the hill above the town. The remaining third is distributed to hat manufactories at the west end of the town and to the spout above-mentioned. This water is generally reputed good, but it has been known to be tainted with gas from some gas works, and therefore cannot be quite safe from contamination by extraneous matters.

Some of those who live on the Coleshill Road, which leads southward out of the town, fetch their supply from a dipping pool in a roadside streamlet about a quarter of a mile distant. This water rises in a spring accessible to cattle, but otherwise safe from pollution, in the hill-side known as the Outwoods. It has been analysed by Dr. Frankland and pronounced to be of excellent quality. In 1873 the Sanitary Authority proposed to bring this water in pipes into the town, and asked sanction from the Board to borrow 500*l.* for the purpose. Mr. Harrison held an inquiry on the subject, and reported that the supply from this source was quite inadequate in amount. On further representation from the Sanitary Authority, however, the loan was sanctioned in 1874. No further steps have been taken to carry out that or any other scheme.

Privies, Cesspits, &c.—I have already described, in relation to the wells, the privies and cesspits, which, with the exception of a few water-closets and hopper closets, form the ordinary provision for the reception of excreta and refuse matters. Owing to the facilities for obtaining coal in the immediate neighbourhood, a great deal is used in Atherstone, and large quantities of ashes are thrown into the cesspits. Where the cesspits do not receive rain water, the ashes serve to absorb much of the moisture.

The emptying of these cesspits is not carried out on any regular plan. The Inspector of Nuisances gives notice to a tenant when his cesspit is becoming a nuisance. The tenant either empties it himself or employs a private scavenger, who charges 4*s.* a load for removing the stuff. Where one privy is used by several tenants, or where several privies have the same cesspit, each tenant tries to shift on to another the onus of emptying it. In any case the operation is sure to be delayed as long as possible, and the Inspector often has to issue a dozen notices before it is done. The Medical Officer of Health has repeatedly urged the Sanitary Authority to bring this necessary work into better system, but nothing has been done to that end.

Sewerage.—A complete system of sewers was laid down in 1868 under the supervision of Mr. Baldwin Latham, at a cost of 4,000*l.* Several of the lateral drains in the narrow courts have become choked and have been taken up and re-laid. These stoppages have doubtless had a share in the pollution of some of the wells. At present the drains and sewers are working very well. Much care has been bestowed upon their ventilation, and with good effect. There are numerous gratings at the road level, and shafts of five or six inches diameter near the heads of the chief sewers, and in every court a ventilating pipe of two or three inches diameter carried up above the bedroom windows. The outfall of the main sewer is about a quarter of a mile outside the town, between the town and the river Anker. The sewage is received in one or other of a pair of tanks, in which a large portion of the solid matter (chiefly sand, ashes, and shreds of logwood used in dyeing hats) is arrested. This stuff is afterwards dug out and used on the land, but its value as manure is very small. The overflow from the tank is conducted in trenches to irrigate the sloping meadows which extend towards the river. The effluent water, as I saw it, was diluted with rain; there was no perceptible smell from it, but it was far from clear. In the summer time there is often a smell from it. It is conveyed in a ditch among meadows for about a mile, and finally enters the river Anker.

In times of heavy rainfall the sewers are found hardly equal to the need, for the fall to the irrigation tanks is very gentle, the calibre of the sewer not very great, and there are some awkward right angles in its course. The sewage has occasionally been backed into some of the lower cellars of the town. This fault has been corrected by providing a means of escape for part of the flood sewage at a bend in the sewers at the west end of the town. At these times a good deal of the solid matter in the tanks is stirred up and carried rapidly away to the river without undergoing much oxidation or decomposition on its way.

Lodging-houses.—The position of Atherstone, on the great north-west road, makes it a night harbour for tramps. Mr. Handford states that on an average 35 a night have taken shelter in the common lodging-houses of the town.

It is plain that there is here an element of danger to the health of the inhabitants, for not only is there a temptation to over-crowding, but there is a risk of importation of disease from other parts of the country. A similar danger is present in connexion with the barge traffic on the Coventry Canal.

Lodging-house inspection is in the hands of the Inspector of Nuisances, and appears to be efficiently performed.

Hospital Accommodation.—For paupers there is good hospital accommodation and means of disinfection in connexion with the workhouse. For non-paupers there is no provision of the kind. The crowded condition of the narrow courts of the town makes this want the more serious.

Remarks.—It may perhaps be doubted whether the Authority are sufficiently impressed with the importance of the measures which are yet demanded to place the town in proper sanitary condition. It is pleaded that the great work of sewerage in 1868 has left a heavy charge on the rates. On the other hand, it is admitted that the staple industry of Atherstone, the hat trade, is now in a thriving state. A matter of such prime importance as a supply of good water ought certainly to be no longer delayed.

POLESWORTH.

Description.—Polesworth is a straggling village situated on either side of the River Anker, about $4\frac{1}{2}$ miles below Atherstone, and lining two or three roads which converge to a bridge over the river. The houses nearest the bridge stand only a few feet above the river, but the chief part of the village stands on dry ground on the slopes of the valley sides.

The village stands just within the margin of the Warwickshire coal-field, and is undermined with the workings of collieries, old and new. The workings under the village north of the river have been long discontinued; those under the southern half are still in operation.

The population of the parish, including two or three neighbouring hamlets, was 2,451 in 1861, and 2,679 in 1871. At present, judging by the number of inhabited houses according to a census made for the school board, the population is about 3,086. The greater part of these are employed in the neighbouring coal-mines.

The dwellings for the most part are of a purely rural type, with thatched roofs and walls of "wattle and daub" in a frame of timber, having scant window space and bad ventilation. Many of them are of great age, having incorporated in their structure remains and fragments of some old monastic buildings belonging to an abbey that formerly stood on the north side of the river. In the southern part there are several rows of miners' cottages recently erected, brick-built and slate-roofed and better ventilated. In the prosperous years of the coal trade, 1873-4, before the new cottages were built, there was much over-crowding here, aggravated by the practice of taking two sets of lodgers, one by night and the other by day. At the present time, with increased accommodation and slackened trade, there is very little over-crowding.

Water Supply.—Drinking water is obtained almost entirely from wells sunk through sandy or shaly beds of the coal formation. The strata appear to be much broken, and great differences are noticed in the height at which the water stands in different wells not far apart. The wells on the northern side of the river are said to have been drained to a serious extent in former times by the coal workings under the village, and to remedy this injury the wells were put in connexion with the river 30 or 40 years ago by a tile drain carried across an intervening meadow. In this way, if the supply from the land springs failed, the deficiency was made good from the river. The drain, as I understood, has not been examined since it was laid down, and it is quite uncertain how far there is still free communication between the wells and the river. Some of the wells yield clear water at all times, even when the river is turbid, showing either that the river water is filtered by passing through a porous bed before reaching those wells, or that the supply from the land is so copious as to exclude the river water altogether. During the last few years the wells are said to have "recovered themselves," owing to the abandonment of the coal workings underneath, which (it is supposed) have become filled with water. If this is the case, I should think it likely that the drain above described may act rather as an outlet than an inlet. At the time of my inspection it was impossible to decide the question, for the river was high and muddy, and the mouth of the drain, which lies in a swamp at the side of a mill-pool, could not be seen. It has been proposed, with a view of improving the water supply, to lay a new drain or duct into the mid-channel of the river, higher up the stream.

It does not appear to have been sufficiently considered whether the water of the river is fit to be used at all for drinking purposes. The river (Anker) rises in the hills to the south-east of Nuneaton, and flows through that town and past the little villages Weddington, Caldecote, Mancetter, and Witherley before reaching the neighbourhood of Atherstone. It there receives the effluent water of the Atherstone sewage, and then flows by the village of Grendon to Polesworth.

It is impossible that the river can have escaped pollution in this course, and its water ought to be regarded as unfit for drinking purposes. Rather than attempt to make new communication between the river and the wells it would be desirable to cut off any communication at present existing. The precarious filtration which the water seems to undergo between the river and the wells cannot be trusted to purge it of impurities which it may hold in solution.

Some of the wells are manifestly in danger of pollution from privies and pigsties standing near. At one cottage I heard the complaint that when a neighbouring cesspit was full the water was bad. Others of the wells, especially on the higher ground, are probably free from excremental contamination, but, owing to the variable character of the strata in which the wells are sunk, it would be unsafe to give an opinion without analysis of the water. I believe none of the Polesworth water has been submitted to analysis. I should add that on one estate, including a great part of the village, steps have been taken to keep out surface drainage from several of the wells by puddling around the heads of the wells with clay.

On the south side of the river there are wells of doubtful purity. Some families fetch water from an unprotected spring by the upper side of the Coventry Canal. This is probably good water as it wells from the bank, but no care is taken to guard it from chance defilement. In dry seasons it is doubtful if it is not partly supplied from the canal, from which it is separated only by the width of a footpath.

Some of the cottagers, finding the well-water bad, take water from the canal itself at a point where it receives slop drainage from some neighbouring houses.

Privies, &c.—The privies are of the kind usually found in country villages, with brick cesspits allowing soakage of fluids into the soil, and not emptied until they become a nuisance.

Drains are laid along the chief lines of habitation, carrying rain and slop-water, and in some instances the drainage of cesspits. These drains discharge into the river near the bridge.

Local Government Board,
February, 1878.

HUBERT AIRY.

RECOMMENDATIONS.

ATHERSTONE.

1. Steps should be taken to procure a sufficient supply of good water for the whole town. For this purpose it might, perhaps, be found useful to carry out the scheme proposed in 1873 for bringing the Outwoods water into the town, but it would be necessary to supplement it by an additional supply from some other source. The Sanitary Authority should give their best consideration to the suggestion made by Mr. Harrison that they should negotiate with the Coventry Canal Company for permission to lead into the town a large part of the overflow from the reservoir in Merevale Park. In default of this it will be necessary to take skilled engineering advice as to the best means of procuring an ample supply of good water.

In the meantime wells, the water of which is polluted, should be closed, and care should be taken to remove from the neighbourhood of all wells any privies or cesspits or filth of any kind. The further precaution may be taken of puddling round the well-heads to a depth of several feet with clay to keep out surface soakage, but this is a work which, to be of much value, must be very carefully performed.

2. The Sanitary Authority should, in accordance with the advice given by their Medical Officer of Health, take the matter of excrement removal into their own hands, to be carried out either by servants of their own or by a contractor bound by an agreement to certain terms. The real danger to health will not be averted until cesspits from which filth can soak into the soil are done away with and watertight receptacles are used in their stead. These will be safest and most convenient if small and movable. They should admit of easy access by the scavenger, and should be frequently emptied. If an abundant supply of water were brought into the town it might be found best to extend the use of water-closets. For information on these points I would refer the Sanitary Authority to the official Report On Certain Means of preventing Excrement Nuisances in Towns and Villages.

3. Attention should be given to the better paving of courts which are at present ill-paved, and to the proper guttering and spouting of the eaves and buildings which are at present without this provision against damp:

4. The Sanitary Authority should consider in what way they can best use their power (under sections 122-125 and 131-133 of the Public Health Act, 1875) to secure the proper isolation of infected persons, other than paupers, and the proper disinfection of infected things belonging to them.

POLESWORTH.

1. The Sanitary Authority should first take advice as to the possibility of bringing a supply of good water into the village from either side of the valley or from both sides. Should that be found impracticable, it would be necessary to endeavour to make the existing wells (if possible) safe from pollution. Steps should be taken to compel the closing of those which yield notoriously bad water, or water which on analysis is found to be so polluted as to be dangerous to health. Filth of whatever kind should be removed to a safe distance from the wells.

Communication between the wells and the river on the north side should be cut off.

On the south side there is urgent need of a proper supply to the new rows of miners' cottages above the canal, so that the cottagers shall not be tempted to take water from the canal itself.

The spring of water in the canal bank should be secured from danger of pollution.

2. The same reform of arrangements for excrement disposal which is required in Atherstone is also required in Polesworth as a necessary means of guarding the wells from contamination.

LONDON:

Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

[14655.—100.—2/78.]